IN THE CLAIMS

1. (Currently Amended) An apparatus for collecting airborne particles comprising:

an air intake assembly for drawing an air sample into the apparatus;

a separation section coupled to the air intake assembly for separating particles from the air sample;

a capture section coupled to the separation section for transporting the separated particles in a liquid; and

a hydrophobic membrane disposed between the separation section and the capture section for establishing a controllable boundary therebetween.

2. (Withdrawn) The apparatus of claim 1, wherein the air intake assembly comprises:

a first fan positioned proximate a first end of the apparatus;

a motor coupled to the first fan; and

an air duct disposed through the apparatus, wherein the air duct extends from an aperture in a second end of the apparatus and along at least part of a longitudinal axis of the apparatus.

3. (Withdrawn) The apparatus of claim 2, further comprising a second fan positioned inward from the first fan along the longitudinal axis of the apparatus.

4. (Withdrawn) The apparatus of claim 2, wherein the air intake assembly further comprises an impactor for removing large particles from the air sample.

5. (Withdrawn) The apparatus of claim 1, wherein the separation section comprises:

at least one cyclone, wherein the at least one cyclone has a first end for receiving the air sample; and

a vortex breaker section positioned proximate to a second end of the at least one cyclone for concentrating the particles.

6. (Withdrawn) The apparatus of claim 5, wherein the at least one cyclone further comprises:

a primary flow exit port proximate to the first end of the at least one cyclone; and

a particle exit port proximate to the second end of the at least one cyclone.

7. (Withdrawn) The apparatus of claim 5, wherein the separation section comprises eight cyclones disposed radially outward of a center of the apparatus.

8. (Withdrawn) The apparatus of claim 1, wherein the apparatus is adapted to produce a particle concentration factor for particles in a range of approximately one to ten microns.

9. (Original) The apparatus of claim 1, wherein the capture section comprises at least one channel disposed adjacent to the separation section, where said liquid is disposed in the at least one channel.

10 (Original) The apparatus of claim 9, wherein the at least one channel is microfluidic or nanofluidic.

11 (Original) The apparatus of claim 9, wherein the capture section further comprises a liquid collection chamber coupled to the at least one channel.

12 (Original) The apparatus of claim 9, wherein the at least one channel is adapted to transport said liquid to at least one of a fluid collection or fluid-particle analysis device.

13. (Original) The apparatus of claim 9, wherein the liquid is electrostatically charged by a corona charging section comprising:

a plurality of corona tips disposed proximate to the at least one channel; and

a grounding electrode positioned a distance away from the plurality of corona tips.

14. (Original) The apparatus of claim 13, wherein the grounding electrode is electrically isolated from the capture section.

15. (Currently Amended) The apparatus of claim 13, wherein the capture section further comprises a particle collection apparatus comprising:

a loop of particle-collecting material positioned adjacent an aperture in the at least one channel;

a plurality of bearings for translating the loop of particle-collecting material;

a liquid reservoir for depositing a liquid layer onto a first surface of the particle-collecting material, wherein the liquid layer is for collecting the separated particles thereon when the particle-collecting material translates past the aperture in the at least one channel;

a fluid collection chamber for collecting the liquid layer and separated particles disposed thereon; and

a particle removal device positioned adjacent to the loop of particle-collecting material for removing the liquid layer and separated aerosol particles from the particle-collecting material and transferring the liquid and separated particles into the fluid collection chamber.

16. (Original) The apparatus of claim 15, wherein said first surface of the particle-collecting material is treated to be hydrophilic.

17. (Original) The apparatus of claim 16, wherein a second surface of the particle-collecting material is treated to be hydrophobic.

18. (Withdrawn) The apparatus of claim 9, further comprising an electrophoretic pumping cell for manipulating the particles into the liquid in the at least one channel.

19. (Withdrawn) The apparatus of claim 1, wherein the hydrophobic membrane comprises an array of capillaries.

20. (Withdrawn) The apparatus of claim 1, wherein the hydrophobic membrane is comprised of a fluid-repellant mesh.

21. (Withdrawn) The apparatus of claim 20, wherein the mesh is formed of nylon.

22. (Withdrawn) The apparatus of claim 21, wherein the mesh is treated with polytetrafluoroethylene.

23. (Withdrawn) The apparatus of claim 1, wherein the apparatus further comprises an electrostatic precipitator section comprising:

a corona electrode positioned substantially between the intake assembly and the separation section; and

a plurality of charged precipitator plates disposed proximate to a first end of the separation section.

24. (Currently Amended) A system for analyzing airborne particles comprising:

a particle collection apparatus adapted to collect airborne particles comprising:

an air intake assembly for drawing an air sample into the apparatus;

a separation section coupled to the intake assembly for separating particles from the air sample;

a capture section coupled to the separation section for transporting the separated particles in a liquid; and

a hydrophobic membrane disposed between the separation section and the capture section for establishing a controllable air/fluid boundary therebetween; and

a particle analysis device coupled to the collection apparatus for receiving a liquid sample from the capture section.

25. (Withdrawn) The system of claim 24, wherein the air intake assembly comprises:

at least a first fan positioned proximate to a first end of the apparatus;

a motor coupled to the at least first fan;

an air duct disposed through the apparatus, wherein the air duct extends from an aperture in a second end of the apparatus and along at least part of a longitudinal axis of the apparatus; and

an impactor positioned proximate to an end of the air duct distal from the aperture in the second end of the apparatus, wherein the impactor is for removing large particles from the air sample.

26. (Withdrawn) The system of claim 24, wherein the separation section comprises:

at least one cyclone, wherein the at least one cyclone has a first end for receiving the air sample; and

a vortex breaker section positioned proximate to a second end of the at least one cyclone for concentrating the particles.

27. (Original) The system of claim 24, wherein the capture section comprises at least one channel disposed adjacent to the separation section, where said liquid is disposed in the at least one channel.

28. (Withdrawn) The system of claim 26, wherein the at least one channel is coupled to the particle collection chamber or the particle analysis device.

29. (Withdrawn) The system of claim 24, wherein the hydrophobic membrane comprises

an array of capillaries.

30. (Withdrawn) The system of claim 24, wherein the hydrophobic membrane is comprised of a fluid-repellant mesh.

31. (Currently Amended) A method for collecting airborne particles, comprising the steps of:

collecting an air sample;

separating the air sample into a particle flow and a primary air flow;

concentrating the particle flow; and

passing the separated particle flow through a hydrophobic membrane and into a liquid.

32. (Withdrawn) The method of claim 31, wherein the step of separating the air sample further comprises the step of expelling the primary air flow into an outside environment.

33. (Withdrawn) The method of claim 31, wherein the step of passing the particle flow into the liquid flow further comprises the step of electrostatically charging the liquid flow.

34. (Withdrawn) The method of claim 31, wherein the step of passing the particle flow into the liquid flow further comprises the step of electrophoretically manipulating the particles into the liquid.

35. (Withdrawn) The method of claim 31, further comprising the step of removing debris from the hydrophobic membrane.

36. (Withdrawn) The method of claim 35, wherein the step of removing debris from the hydrophobic membrane comprises the steps of:

pressurizing the liquid flow to a level that is greater than a retention pressure of the hydrophobic membrane;

allowing the liquid flow to remove and transport debris lodged in the membrane; and

reducing the water pressure to a level at which the membrane is enabled to re-establish an air-liquid seal.

37 (Withdrawn) An apparatus for collecting airborne particles comprising:

an air intake assembly for drawing an air sample into the apparatus;

a separation section coupled to the intake assembly for separating the particles from the air sample;

a capture section coupled to the separation section for transporting the particles in a liquid; and

a corona charging section disposed between the separation section and the capture section for electrostatically focusing the particles into the liquid.

38. (Withdrawn) The apparatus of claim 37, further comprising a hydrophobic membrane positioned between the separation section and the capture section for creating a fluid seal therebetween.

39. (Withdrawn) The apparatus of claim 37, wherein the air intake assembly comprises:

at least a first fan positioned proximate to a first end of the apparatus;

a motor coupled to the at least first fan;

an air duct disposed through the apparatus, wherein the air duct extends from an aperture in a second end of the apparatus and along at least part of a longitudinal axis of the apparatus; and

an impactor positioned proximate to an end of the air duct distal from the aperture in the second end of the apparatus, wherein the impactor is for removing large particles from the air sample.

40. (Withdrawn) The apparatus of claim 37, wherein the separation section comprises:

at least one cyclone, wherein the at least one cyclone has a first end for receiving the air sample; and

a vortex breaker section positioned proximate to a second end of the at least one cyclone for concentrating the particles.

41. (Withdrawn) The apparatus of claim 37, wherein the apparatus is adapted to produce a particle concentration factor for particles in a range of approximately one to ten microns.

42 (Withdrawn) The apparatus of claim 37, wherein the capture section comprises at least one channel disposed adjacent to the separation section, where said liquid is disposed in the at least one channel.

43 (Withdrawn) The apparatus of claim 42, wherein the capture section further comprises a liquid collection chamber coupled to the at least one channel.

44 (Withdrawn) The apparatus of claim 42, wherein the at least one channel is for transporting the liquid to at least one of a fluid collection or fluid-particle analysis device.

45. (Withdrawn) The apparatus of claim 37, wherein the hydrophobic membrane is comprised of a fluid-repellant mesh.

46. (Withdrawn) The apparatus of claim 37, wherein the apparatus further comprises an electrostatic precipitator section comprising:

a corona electrode positioned substantially between the intake assembly and the separation section; and

a plurality of charged precipitator plates disposed proximate to a first end of the separation section.